

What is claimed is:

1. A membrane module for hydrogen separation, comprising:
a stack of flat membrane packs disposed adjacent one another so as not to exert a force on one another, a feed space for a reformat gas disposed between every two membrane packs in the stack, each membrane pack having a pair of membrane assemblies and a support structure disposed between the pair of membrane assemblies, each membrane assembly including a hydrogen-selective flat membrane supported by at least one membrane frame; and
a rotationally symmetrical pressure shell enclosing the stack of flat membrane packs.
2. The membrane module as recited in claim 1, further comprising a membrane pack holder having a plurality of openings for discharging a permeate gas and wherein the membrane packs have at least one straight edge attached to the membrane pack holder.
3. The membrane module as recited in claim 2, wherein the membrane pack holder forms a base that is attached to the rotationally symmetrical pressure shell.
4. The membrane module as recited in claim 3, wherein the membrane pack holder has a circular shape and the rotationally symmetrical pressure shell has a cylindrical shape.
5. The membrane module as recited in claim 2, wherein the support structure of each membrane assembly includes a pair of perforated support foils and a support plate disposed between the pair of support foils, the support structure supporting the membrane of a respective membrane assembly against a trans-membrane pressure differential, the support plate containing plurality of straight channels running parallel to one another and to the membrane.
6. The membrane module as recited in claim 5, wherein the plurality of straight channels communicates with the plurality of openings in the membrane pack holder.
7. The membrane module as recited in claim 5, wherein each support plate is made of sheet metal including multiple bends so as to form the channels.

8. The membrane module as recited in claim 5, wherein each support plate is made of sheet metal including multiple webs for forming the channels.
9. The membrane module as recited in claim 1, wherein an inner edge of each membrane frame has the form of a rectangle with rounded corners.
10. The membrane as recited in claim 9, wherein each membrane is welded in a gastight manner along edges of the membrane onto the at least one membrane frame.
11. The membrane module as recited in claim 1, wherein each membrane frame facing the reformat gas includes inner rims having rounded membrane-side edges.
12. The membrane module as recited in claim 1, a flat surface of one of the at least one membrane frames of each membrane assembly includes a channel extending around an inner edge of the membrane frame, the being accessible for a hold-down for pressing the membrane into the channel during welding.
13. The membrane module as recited in claim 1, wherein each membrane frame includes steel having a coefficient of heat expansion equal to or less than a coefficient of heat expansion of the membrane.
14. The membrane module as recited in claim 1 further comprising an upper gastight plate, a lower gastight plate, an upper feed space disposed on an uppermost membrane pack of the stack and a lower feed space disposed on the lowermost membrane pack, the upper and lower feed spaces having a same size as the feed spaces disposed between every two membrane packs, the upper and lower feed spaces being delimited by the upper and lower gastight plates.
15. The membrane module as recited in claim 1, further comprising a device for creating gas turbulence disposed in at least one of the feed spaces.

16. The membrane module as recited in claim 15, wherein the device includes a plate-shaped component made of a porous material at least partially filling the feed space.

17. The membrane module as recited in claim 1, further comprising a high temperature catalyst stage, disposed upstream from the stack of membrane packs and within the pressure shell.

18. The membrane module as recited in claim 1, further comprising an insulating material at least partially filling a space between the stack of membrane packs and the rotationally symmetrical pressure shell.

19. The membrane module as recited in claim 2, further comprising a gas collector extending transversely to the openings in the membrane pack holder on a side of the membrane pack holder facing away from the pressure shell.